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DESCRIPTION OF THE PATENT OF THE INVENTION

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(54) METHOD OF INORGANIC FIBERS PRODUCTION FROM ROCKS

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(57) Method of inorganic fibers production from rocks, which includes rock batching into the melting zone, heating of the charge up to the melting temperature, homogenization of the melt and drawing off the continuous fiber, and differs in the andesite, which is used as a source rock and rock heating is conducted up to the temperature of 1705-2100°C and melt viscosity 120-2750 pz.

The present invention is related to the technology of acid stable inorganic fibers production from rock melts.

Most similar to the declared method is the method of inorganic fibers production from basalt rocks, including rock batching into the melting zone, heating it up to the melting temperature, homogenization of the melt and drawing off continuous fibers [1].

In accordance with this method, rock is heated up to the temperature of 1500-1600°C and fiber is drawn off at the speed of 3500-4500 m/min from the melt with viscosity of 110-500 pz. Fibers, made in accordance with this method, has average stability of 65-77% after 3 hours of boiling in the 2N HCl solution.

Disadvantage of the known method is a relatively low stability to acids of produced basalt fibers, to the 2N HCl solution in particular, which makes 65-77%.

An objective of this invention was to originate such a method of inorganic fibers production, in which it is possible to produce an inorganic

continuous fiber with diameter of 6 µm and improved stability to acids (to the 2N HCl solution in particular), by varying the raw material compound and process parameters.

The fixed objective is solved in such a way; in the known method of the acid stable fiber production from rocks, including rock batching in to the melting zone, its heating up to the melting temperature, obtaining the melt, feeding of the produced melt into the homogenization zone, where temperature, exceeding the crystallization temperature, is kept, homogenized melt is fed to the fiber forming zone, according to the invention, andesite is used as rock and rock is heated up to the temperature of 1705-2100°C, the melt viscosity in the fiber formation zone is 120-2750 pz.

Such accomplishment of the proposed fiber production method secures production of the continuous fiber with the diameter of less than 6 µm. At the same time thermal stability and stability to acids of continuous andesite fibers increases.

The essence of an invention is clear from the following example of its realization.

Method, in accordance with this invention is accomplished in the following way. Andesite rock is fed into the melting zone of the smelting furnace, where rocks are heated to the temperature of 1705-2100°C and melt is produced. In order to homogenize the produced melt, it is kept in the homogenization zone for a certain time. And then, a homogenized melt is fed to the fiber formation zone, which includes feeder with draw plates, where temperature, exceeding the crystallization temperature of the obtained melt is kept. Melt is drawing off from the draw plates in a form of drops, forming bulbs, which are stretched into fibers. Fibers are drawn off at the viscosity of the melt equal to 120 p_z and reeled into bobbins by means of the winder assembly. As a result of the bobbin rotation, continuous andesite fibers are reeled on.

In order to avoid frictions between fibers in the bundle, mutual conglutination and to protect outer surface of the fiber from the influence of the environment, fibers are coated with the grease during fibers processing. Bobbins with the continuous andesite fibers reeled on them are taken from the bobbin holder and transferred for further processing.

Continuous andesite fibers, produced by the proposed method, have a mean diameter of the elementary fiber less than 6 μm and are more stable to acids.

Chemical stability of continuous fibers to the 2N solution of HCl was determined by the mass loss from the surface of 5000 cm² after 3 hours boiling (table).

Examples of the method accomplishment are given in the table 2.

Table 1.

Medium	Andesite		Basalt	
	Mass Loss, mg	Chemical Stability, %	Mass Loss, mg	Chemical Stability, %
2N HCl solution	405.2	90.8	1099.7	77.5

Table 2.

Name of the parameter	Meaning of the parameter				
Temperature of the melt in the furnace, °C	1350	1450	1705	2100	2150
Viscosity, p _z	2750	510	305	120	110
Tensile strength, kg/mm ²	205	217	228	180	160
Mean diameter of the elementary fiber, μm	5.4	4.6	3.9	5.7	5.8
Ratio of the acids stability of the andesite fiber, produced in accordance with the proposed method to the acids stability of the fiber, produced in accordance with the prototype method	115	116	118	120	115